

Industrial and Management Engineering IIT Kanpur

IME637A: Advanced decision models

3-0-0-9

Course objectives: The course aims to expose students to advanced decision techniques and models to enable them in effectively modeling and applying appropriate tools in solving management and engineering problems.

Prerequisites: IME605A: Operations Research for Management

Course contents:

Integer linear programming: Implicit Enumeration and Cutting Plane methods, Dynamic Programming: Deterministic and Probabilistic dynamic programming; Markov Decision process; Markov chains, Analytical Hierarchy process, Data Envelopment Analysis, Non-linear programming: Unconstrained and constrained optimization; Lagrangian relaxation and KKT conditions; Search, gradient and penalty based methods; Quadratic programming, Queues and queuing networks, Metaheuristics and their applications to combinatorial optimization problems such as scheduling and allocation problems.

Class schedule:

Tuesday: 10.30 a.m. - 12.00 noon (Venue: C3, IME Building)

Thursday: 12.00 - 1.30 p.m. (Venue: C3, IME Building)

Instructor: Dr Sri Vanamalla V (email: vanamala@iitk.ac.in)

Grading:

Quizzes (2): 25

Assignments: 15

Mid-semester: 25

End-semester: 35

(There may be a slight variation in these weights which will be informed.)

Books:

- (1) Laurence A. Wolsey, *Integer Programming*, Wiley
- (2) Richard Bellman, *Dynamic Programming*, Dover
- (3) Rangarajan K. Sundaram, *A First Course in Optimization Theory*, Cambridge
- (4) Non linear programming - Theory and Algorithms: Bazaraa, Sherali, Shetty
- (4) Wayne L. Winston, *Operations Research: Applications and Algorithms*
- (5) Introduction to the theory and application of Data Envelopment Analysis - Emmanuel Thanassoulis
- (6) Linear and non linear programming - David G Luenberger
- (7) Numerical Optimization - Jorge Nocedal and Stephen J Wright
- (8) Katta G. Murty, *Linear Programming*, Wiley

12 January, 2018

Sd/- Sri Vanamalla V